CLAIMS

1. A fire resistant composition for forming a fire resistant ceramic at elevated temperatures, the composition comprising:

at least 15% by weight based on the total weight of the composition of a polymer base composition comprising at least 50% by weight of an organic polymer;

at least 15% by weight based on the total weight of the composition of a silicate mineral filler; and

at least one source of fluxing oxide which is optionally present in said silicate mineral filler,

wherein after exposure to an elevated temperature experienced under fire conditions, a fluxing oxide is present in an amount of from 1 to 15% by weight of the residue.

2. The fire resistant composition of claim 1, wherein the silicate mineral filler is present in an amount of at least 25% by weight based on the total weight of the composition.

3. The fire resistant composition of claim 1, wherein the fluxing oxide is present in the residue in an amount of 1-10 wt.% after exposure to said elevated temperatures.

4. The fire resistant composition of claim 1, wherein the fluxing oxide is present in the residue in an amount of 2-8wt. % of the residue after exposure to said elevated temperature.

5. The fire resistant composition of claim 1, wherein the weight of the residue after firing is at least 40% of the fire resistant composition.

6. A fire resistant composition of any one of claims 1-5, wherein the composition forms a self-supporting structure when heated to an elevated temperature experienced under fire conditions.

7. The fire resistant composition of any one of claims 1-5, wherein the fluxing oxide is generated by the silicate mineral filler being heated to an elevated temperature.

8. The fire resistant composition of any one of claims 1-5, wherein the fire resistant composition further comprises at least one additive selected from the group of a fluxing oxide and precursors of fluxing oxides.

9. The fire resistant composition of claim 8, wherein the composition comprises at least two different fluxing oxides or precursors to fluxing oxides which form liquid phases at different temperatures.

10. A fire resistant composition according to claim 8, wherein the at least one of fluxing oxide precursor comprises one or more materials selected from the group consisting of borates, metal hydroxides, metal carbonates and glasses.

11. A fire resistant composition according to claim 8, wherein the fluxing oxide added or derived from precursors comprises at least one oxide of an element selected from the group consisting of lead, antimony, boron, lithium, potassium, sodium, phosphorous and vanadium.

12. A fire resistant composition according to any one of claims 1-5, wherein the composition has less than 10% change in linear dimension after heating at an elevated temperature experienced under fire conditions.

13. A fire resistant composition according to any one of claims 1-5, wherein the composition has less than 5% change in linear dimension after heating at an elevated temperature experienced under fire conditions.

14. A fire resistant composition according to any one of claims 1-5, wherein the composition remains coherent when heated to temperatures of less than 1050°C for 30 minutes.

15. The fire resistant composition of any one of claims 1-5, wherein after exposure to an elevated temperature experienced under fire conditions , the fire resistant composition has a flexural strength of at least 0.3 MPa.

ART 34 AMDT

16. A fire resistant composition of any one of claims 1-5, wherein the organic polymer is selected from the group of thermoplastic polymers, thermoset polymers and elastomers.

17. A fire resistant composition of any one of claims 1-5, wherein the organic polymer comprises at least one of homopolymer or copolymer or elastomer or resin of polyolefins, ethylene-propylene rubber, ethylene-propylene terpolymer rubber (EPDM), chlorosulfonated polyethylene and chlorinate polyethylene, vinyl polymers, acrylic and methacrylic polymers, polyamides, polyesters, polyimides, polyoxymethylene acetals, polycarbonates, polyurethanes, natural rubber, butyl rubber, nitrile-butadiene rubber, epichlorohydrin rubber, polychloroprene, styrene polymers, styrene-butadiene, styrene-isoprene-styrene,styrene-butadiene-styrene, styrene-ethylene-butadiene-styrene, epoxy resins, polyester resins, vinyl ester resins, phenolic resins, and melamine formaldehyde resins.

18. The fire resistant composition of any one of claims 1-5, wherein the polymer base composition comprises from 15 to 75wt.% of the formulated fire resistant composition.

19. The fire resistant composition of any one of claims 1-5, wherein the silicate mineral filler is at least one selected from the group consisting of alumino-silicates, alkali alumino-silicates, magnesium silicates and calcium silicates.

20. The fire resistant composition of any one of claims 1-5, comprises an additional inorganic filler selected from the group consisting of silicon dioxide and metal oxides of aluminium, calcium, magnesium, zircon, zinc, iron, tin and barium and inorganic fillers which generate one or more of these oxides when they thermally decompose.

21. The fire resistant composition of any one of claims 1-5, wherein the polymer base composition further comprises a silicone polymer.

22. The fire resistant composition of claim 21, wherein the weight ratio of organic polymer to silicone polymer is within the range of 5:1 to 2:1.

23. The fire resistant composition of any one of claims 1-5, further comprising a silicone polymer in an amount of from 2 to 15 wt.% based on the total weight of the formulated fire resistant composition.

24. A fire resistant composition according to any one of claim 1-5, wherein the elevated temperature experienced under fire conditions is 1000°C for 30 minutes.

25. A fire resistant composition according to claim 1, wherein:

20 to 75% by weight of said polymer base composition wherein said composition further comprises a silicone polymer;

at least 15% by weight of an inorganic filler wherein said inorganic filler comprises mica and a glass additive; and

wherein the fluxing oxide in the residue is derived from glass and mica wherein, the ratio of mica: glass is in the range of from 20:1 to 2:1.

26. A fire resistant composition according to claim 25, wherein the polymer base composition comprises organic polymer and silicone polymer in the weight ratio of from 5:1 to 2:1;

said inorganic filler comprises 10 to 30% by weight of the total composition of mica and 20 to 40% by weight of the total composition of an additional inorganic filler.

27. A fire resistant composition of any one of claims 1-5, wherein the fluxing oxide is present in the residue in an amount in excess of 5% by weight of the residue, said fluxing oxide forming a glassy surface layer on the ceramic formed on exposure to fire, said glassy surface layer forming a barrier layer which increases the resistance to passage of water and gases.

28. A fire resistant cable comprising a conductive element and at least one insulating layer and/or sheathing layer made of a fire resistant composition for providing a fire resistant ceramic under fire conditions, the fire resistant composition comprising:

at least 15% by weight based on the total weight of the composition of a polymer base composition comprising at least 50% by weight of an organic polymer;

at least 15% by weight based on the total weight of the composition of a silicate mineral filler; and

at least one source of fluxing oxide which is optionally present in said silicate mineral filler,

wherein after exposure to an elevated temperature experienced under fire conditions, a fluxing oxide is present in an amount from 1 to 15%by weight of the residue.

29. A fire resistant cable of claim 28, wherein the silicate mineral filler is present in an amount of at least 25% by weight based on the total weight of the composition.

30. The fire resistant cable of claim 28, wherein the fluxing oxide is present in the residue in the fire resistant composition in an amount of 1-10 wt.% after exposure to said elevated temperatures.

31. The fire resistant cable of claim 28, wherein the fluxing oxide is present in the residue of the fire resistant composition in an amount of 2-8 wt.% after exposure to said elevated temperature.

32. The fire resistant cable of claim 28, wherein the weight of the residue after firing is at least 40% of the fire resistant composition.

33. A fire resistant cable of claim 28, wherein the composition forms a self-supporting structure when heated to an elevated temperature experienced under fire conditions.

34. The fire resistant cable of any one of claims 28-33, wherein the fluxing oxide is generated by the silicate mineral filler being heated to an elevated temperature .

35. The fire resistant cable of any one of claims 28-33, wherein the fire resistant composition further comprises at least one additive selected from the group of fluxing oxides and precursors to fluxing oxides.

36. The fire resistant cable of claim 35, wherein the fire resistant composition comprises at least two different fluxing oxides or precursors to fluxing oxides which form liquid phases at different temperatures.

37. A fire resistant cable according to claim 35, wherein at least one of fluxing oxide precursor comprises one or more materials selected from the group consisting of borates, metal hydroxides, metal carbonates and glasses.

38. A fire resistant cable according to claim 35, wherein the fluxing oxide added or derived from a precursor to a fluxing oxide comprises at least one selected from the group consisting of an oxide of an element selected from the group consisting of boron, lithium, potassium, sodium, phosphorous vanadium, lead and antimony.

39. A fire resistant cable according to any one of claims 28-33, wherein the composition has less than 10% change in linear dimension after heating at an elevated temperature experienced under fire conditions.

40. A fire resistant cable of any one of claims 28-33, wherein the composition has less than 5% change in linear dimension after heating at an elevated temperature experienced under fire conditions.

41. A fire resistant cable according to any one of claims 28-33, wherein the fire resistant composition remains coherent when heated to temperatures of less than 1050°C for 30 minutes.

42 A fire resistant cable of any one of claims 28-33, wherein the organic polymer is a thermoplastic and crosslinked olefin based polymer selected from the group of homopolymers of olefins, copolymers or terpolymers of one or more olefins and a blend of homopolymers, copolymers and terpolymers.

43. A fire resistant cable of any one of claims 28-33, wherein the organic polymer comprises at least one of homopolymer or copolymer or elastomer or

resin of polyolefins, ethylene-propylene rubber, ethylene-propylene terpolymer rubber (EPDM), chlorosulfonated polyethylene and chlorinate polyethylene, vinyl polymers, acrylic and methacrylic polymers, polyamides, polyesters, polyimides, polyoxymethylene acetals, polycarbonates, polyurethanes, natural rubber, butyl rubber, nitrile-butadiene rubber, epichlorohydrin rubber, polychloroprene, styrene polymers, styrene-butadiene, styrene-isoprene-styrene,styrene-butadiene-styrene, styrene-ethylene-butadiene-styrene, epoxy resins, polyester resins, vinyl ester resins, phenolic resins, and melamine formaldehyde resins.

44. A fire resistant cable of any one of claims 28-33, wherein the fire resistant composition comprises an additional inorganic filler selected from the group consisting of silicon dioxide and metal oxides of aluminium, calcium, magnesium, zircon, zinc, iron, tin and barium and inorganic fillers which generate one or more of these oxides when they thermally decompose.

45. A fire resistant cable comprising a conductive element and at least one insulating layer and/or sheathing layer made of a fire resistant composition of any one of claims 1-4.

46. A fire resistant cable of any one of claims 28-33, wherein the polymer base composition in the fire resistant composition further comprises a silicone polymer.

47. A fire resistant product formed from the composition of any one of claims 1-5.

48. The fire resistant product of claim 47, used in passive fire protection applications and general engineering applications where passive fire protection properties are required.